Abstract Submitted for the DFD17 Meeting of The American Physical Society

Wettability dynamics of liquid filaments on horizontal substrates¹ JAVIER DIEZ, PABLO RAVAZZOLI, INGRITH CUELLAR, ALEJANDRO GON-ZALEZ, Instituto de Fsica Arroyo Seco (CIFICEN-CONICET), Universidad Nacional del Centro de la Provincia de de Buenos Aires — We study the hydrodynamic mechanisms involved in the motion of the contact line formed at the end region of a liquid filament laying on a planar and horizontal substrate. Since the flow develops under partially wetting conditions, the tip of the filament recedes and forms a bulged region (head) that subsequently develops a neck region behind it. Later the neck breaks up leading to a separated drop, while the rest of the filament restarts the sequence. One main feature of this flow is that the whole dynamics and final drop shapes are strongly influenced by the hysteresis of the contact angle typical in most of the liquid-substrate systems. The time evolution till breakup is studied experimentally and pictured in terms of a hybrid wettability theory which involves the Cox-Voinov hydrodynamic approach combined with the molecular kinetic theory developed by Blake. The parameters of this theory are determined for our liquid-substrate system (silicone oilcoated glass). The experimental results of the retracting filament are described in terms of a simple heuristic model and compared with numerical simulations of the full Navier-Stokes equations. This study is of special interest in the context of pulsed laser-induced dewetting.

¹The authors acknowledge support from Consejo Nacional de Investigaciones Cientficas y Tcnicas (CONICET, Argentina) with grant PIP 844/2012 and Agencia Nacional de Promocin Científica y Tecnolgica (ANPCyT, Argentina) with grant PICT 931/2012.

> Javier Diez Universidad Nacional del Centro de la Provincia de de Buenos Aires

Date submitted: 27 Jul 2017

Electronic form version 1.4